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Marshall engineers begin Shuttle upgrade pre-development testing

by Debra Valine

To upgrade the reliability and safety of the Space Shuttle's Solid Rocket Booster, Marshall engineers are performing pre-development tests of the proposed Helium-driven auxiliary power unit (HeAPU) in support of the Shuttle Upgrades Program.

The Solid Rocket Booster Thrust Vector Control Upgrades effort is one of four Shuttle propulsion enhancements being planned for fleet implementation by 2005. Other enhancements include the

Space Shuttle Main Engine Advanced Health Management System, Enhanced Nozzle design studies, and Friction Stir Welding on the External Tank. The Marshall Center manages all four upgrades. The goal is a significant increase in ascent reliability.

Currently, the Solid Rocket Booster Thrust Vector Control system is powered by hydrazine, a highly volatile and toxic rocket fuel that presents a risk of fire if

See Upgrade on page 8

Atlantis to launch July 12 on milestone flight to deliver Station's new doorway to space

NASA release

Space Shuttle Atlantis will launch July 12 to carry a new airlock to the International Space Station. The mission will bring the orbiting outpost an unprecedented degree of self-reliance, providing it with a new doorway to space for maintenance and construction.

Atlantis is scheduled for liftoff at 4:04 a.m. CDT July 12 from Kennedy Space Center, Fla., at the beginning of an approximately five-minute launch window. Atlantis' mission, designated STS-104, will be the fourth Shuttle flight this year and the 10th Shuttle mission dedicated to assembly of the International Space Station.

"This mission will be a milestone for both the Station and Shuttle as we complete a major phase of the station's assembly," Space Shuttle Program Manager Ron Dittmore said.

"A year ago, I said we would fly the most complex series of missions NASA has undertaken since landing on the Moon — now we're nearing completion of the first phase. The team has truly done an excellent job to get us here safely, successfully and on schedule."

Atlantis' mission includes three spacewalks to install and outfit the Station's new Joint Airlock, including the first-ever outside spacewalk to originate from the Station.

Air Force Lt. Col. Steve Lindsey will command Atlantis' crew. Marine Corps Maj. Charlie Hobaugh will serve as pilot.

The crew also includes astronauts Mike Gernhardt, Janet

Kavandi and Jim Reilly. Gernhardt and Reilly will perform the planned spacewalks, while Kavandi operates the Shuttle's robotic arm. The mission will be the second Shuttle to visit the Station during the stay of the second Station crew — Commander Yuri Usachev and Flight Engineers Jim Voss and Susan Helms — now in their fourth month aboard the complex.



Marshall Center photo

The new airlock will make spacewalks easier.

Teamwork at its best

On June 27, I was driving home from work at about 7 p.m. when I got a page that was labeled “urgent.” Upon calling the NASA Information Support Center, I was told that Shawna Broussard, the vice-president of the Marshall Child Development Center Board of Directors, needed to talk with me. I called Shawna and she told me the



Stephenson

scary news that one of our center teachers had been diagnosed with meningitis. The immediate concern was for the teacher, but also for the children since a certain type of meningitis can be very contagious and dangerous.

I asked Shawna to call Sheila Cloud, our director of the Center Operations Directorate, to whom the Child Development Center reports. Shortly after arriving home, I got a call from Sheila and she, together with Tereasa Washington, director of the Customer and Employee Relations Directorate, had mobilized both the Center Operations and Customer and Employee Relations teams to address the matter. They had already made the decision not to open the child development center the next day, and recom-

mended to me that parents of the children be given administrative leave to take care of their children and get them to the doctor, if necessary. They had already contacted several doctors in town familiar with the disease and who had an understanding of what might happen depending on the outcome of testing performed that afternoon on the patient.

I called Joe Rothenberg, NASA's associate director for space flight at NASA Headquarters in Washington, D.C., to inform him of the situation, and also Dr. Richard S. Williams, the NASA Chief Health and Medical Officer, who immediately called Sheila and was briefed. NASA Administrator Dan Goldin knew about the event within hours of notification through a call from Rothenberg.

A call from Sheila at 9 p.m. indicated that all was in place to deal with the situation. Parents were being called to inform them of the situation and to let them know that the child development center would be closed for a thorough cleaning and disinfecting the next day. The doctors were giving preliminary indications that the type of meningitis was fortunately not the worst kind, but the worst was being assumed until word came back from the tests the next morning. Tereasa and Sheila were still working to ensure that communications with the parents were complete and to ready our media folks to talk to the press as needed. No one on the CO or CaER team left before everything they could think of was in place. It was another late night for our support people — but all in the line of

Director's Corner

duty.

The good news came the next morning regarding the nature of the disease.

I am proud of the selfless way in which Sheila and Tereasa and their teams responded to this potentially very serious situation. Whatever personal plans they had for that evening were immediately dropped to respond to this situation. They walked the talk regarding our number one priority of Safety. Our People, Teamwork and Excellence Values were demonstrated to the max.

I am grateful to be a part of a team at Marshall that cares so much about our people and works so well together to do what is needed when it is needed.

Please join me in thanking the people of CO and CaER for their outstanding real-time response. Every one of us can relate to the parents whose children attend the Marshall Child Development Center. The actions taken that evening might have made a tremendous difference in the lives of those families had the disease been seriously contagious. The action taken to close and clean the child development center before reopening prevented the potential spreading of a serious disease to the children.

— **Art Stephenson,**
Center Director

John F. Yardley, human space flight pioneer, dies

NASA release

John F. Yardley, a leading figure in the early days of human space flight and the Space Shuttle program, died early June 26. He was 76.

“John Yardley was as responsible as any individual for getting the Space Shuttle program off the ground. He made STS-1 happen,” said NASA Administrator

Dan Goldin. “His experience and leadership through NASA's early human space flight efforts paved the way for his great contributions to the Space Shuttle program. Two decades later, John's legacy lives on with each successful Space Shuttle mission.”

After three years in the Navy during World War II, Yardley began his aerospace

career at McDonnell Douglas in 1946. While at McDonnell Douglas, he worked on cutting-edge human space flight projects, leading the design team for the Mercury spacecraft, and serving as launch operations manager for the Mercury and Gemini space-

See Yardley on page 9

Marshall awards contracts to two Tribal-Owned businesses

by Debra Valine

For the first time in its history, the Marshall Center has awarded prime contracts to two Tribal-Owned businesses.

Earlier this year, Marshall's Procurement Office contracted with Cherokee Nation Industries, a Tribal-Owned, Native-American company of Stillwell, Okla., and Integrated Concepts Research Corp., a Tribal-Owned, Native-Alaskan company of Anchorage, Alaska. Each contract is for five years — base plus four option periods.

The Cherokee Nation Industries contract — valued at \$15.6 million — will provide Program Support Services to the Microgravity Research Program Office. The contract was awarded as a Cost Plus Incentive-Fee contract for the period from Jan. 3, 2001, through Jan 2, 2006.

The Marshall negotiation team was Sherri W. Stroud, a contract specialist in the Science and Center Operations Support Department, and Blair J. Herren, the contracting officer's technical representative in the Microgravity Research Program Office.

The Integrated Concepts Research Corp. contract — valued at \$12.6 million — will provide Materials Testing for Aerospace Environments at Marshall's Materials, Processes and Manufacturing Department. This is also a Cost Plus Incentive-Fee contract with performance measurements. The contract is for the period from Feb. 28, 2001, through Feb. 27, 2006.

The Marshall negotiation team was Ollie G. Ragland, a contract specialist in the Engineering Support Department; Michael R. Sosebee, a contracting officer in the Engineering Support Department; and Eddie Davis, the contracting officer's technical representative in Materials, Processes and Manufacturing Department.

Neither of the contracts was competed based on the Acquisition Plan and guidance from the Small Business Administration Office that outlines policy regarding Tribal-Owned businesses. Both contracts are follow-ons to pre-existing contracts.

"NASA is committed to promoting maximum practicable opportunities for tribals to participate in performing contracts with federal agencies to meet mission goals," said Ragland, contract administrator for the Integrated Concepts Research Corp. contract.

These contracts are representative of Marshall's efforts at meeting socio-economic goals under the Small Business Administration 8(a) Program, and furthers Congressional initiatives and requirements as outlined in FAR 26.102.

Congress has assumed the responsibility of assisting the tribes in developing the economies of their reservations and villages where unemployment often exceeds 70 percent. Congress, by providing tribal firms-unique rights under the Small Business Administration 8(a) Program, is attempting to address this issue.

The writer, employed by ASRI, is the Marshall Star editor.

Garry Lyles to head propulsion team for NASA's Space Launch Initiative

Garry M. Lyles has been named manager of the Space Launch Initiative's Propulsion Project Office at the Marshall Center.

In this new position, Lyles will lead the propulsion effort that will eventually launch a second generation reusable launch vehicle and return it to a landing site on Earth. Technology development will include reusable propulsion systems involving main engines, main propulsion systems and auxiliary propulsion systems. The Propulsion Project Office also will develop propulsion systems for emergency crew escape systems.

Lyles most recently was manager of the Advanced Space Transportation Program Office at Marshall, responsible for developing NASA's space

transportation and propulsion "roadmaps" for the next 25 years.

Since coming to NASA in 1976, Lyles has held several propulsion-related positions, including chief engineer for the Space Shuttle Main Engine in the Space Transportation Systems Chief Engineers Office; chief of the Canoga Park Resident Office for the Space Shuttle Main Engine Project Office; and division chief of the Propulsion Systems Division of Marshall's Propulsion Laboratory.

He earned his bachelor's degree in mechanical engineering at the University of Alabama in Tuscaloosa.

Lyles is married to the former Diane Miller and has four children.

NASA's Space Launch Initiative is the key to opening the space frontier for continued scientific exploration and



Lyles

economic expansion — by making space flight affordable and safe for both the government and private industry.

Marshall Center leads NASA's efforts in development of space transportation and propulsion systems and technologies.

External tank production to continue to 2012-2015; NCAM key to materials development

Michoud release

During a recent visit to the Michoud Assembly Facility in New Orleans, Marshall Center Director Art Stephenson presented his vision to NASA and Lockheed Martin



Stephenson

employees — a road to advanced manufacturing.

Lockheed Martin builds the Space Shuttle external tank for NASA at Michoud. Stephenson noted 104 shuttle flights and the external tank's 100 percent mission success. He praised the external tank's evolution of continuous improvements from a standard weight to super lightweight tank, to the implementation of Friction Stir Welding later this year.

"Michoud and Lockheed Martin have consistently met the challenge of delivering tanks on schedule — and your record is truly outstanding — and I expect to see these tanks fly for many years to come," Stephenson said.

As part of the Space Launch Initiative, Stephenson expects the Shuttle to evolve in parallel with the development of new launch vehicles, and to fly well into the year 2015 and beyond.

Stephenson challenged Lockheed Martin employees to be world leaders in manufacturing through the National Center

for Advanced Manufacturing (NCAM), and to work with NASA to find lighter, stronger and more capable materials, similar to the way the external tank evolved.

The National Center for Advanced Manufacturing is the tool to move Michoud toward developing advanced composite structures and tanks and, later, other advanced materials development for aerospace and other applications.

The effort will be led from Marshall where material and process development will take place to support NASA technology goals. Large scale manufacturing development, education and training will take place at Michoud.

In closing, Stephenson thanked Michoud employees for the work they're doing. "We need you, the Shuttle program needs you, and you've got a long history ahead of you as you stay in the forefront of advanced manufacturing technology," he said.

New online process will make applying for jobs faster, easier

NASA release

Finally, there will be an easier way to apply for NASA jobs. NASA is introducing a new resume management process and system called NASA STARS — NASA's automated Staffing And Recruitment System. This new process will enable NASA to enhance its human resources capabilities to attract and retain a world-class workforce in an increasingly difficult job market.

No longer will applicants have to fill out lengthy forms and supply additional forms to address specific knowledges, skills and abilities for each job. One online resume will put the employee in the jobs database, and the Human Resources Department, with its new system, will handle the rest. The electronic resume will replace the cumbersome application forms that were used before. Employees will no longer need to separately address knowledges, skills and abilities (KSAs) as employees' total skills will be captured on one resume.

"The Marshall Center will receive NASA STARS in July," said Danny Hightower, manager of Marshall's Human Resources Department. "Once training by the human resources personnel is

complete, the new process will be implemented for the entire Center. It is expected that NASA STARS will be available to Marshall employees in August."

NASA STARS uses a commercial off-the-shelf applicant ranking and referral software system called Resumix. Using state-of-the-art technology and artificial intelligence, Resumix "reads" and extracts skills information from resumes. It reads words and phrases "in context" to automatically match skills in applicants' resumes to the skills requirements of specific jobs. In a very short time period, Resumix identifies resumes submitted for a vacancy announcement, and searches those resumes for skills to match the position requirements.

The entire process is faster and easier for employees. Applicants will be able to access NASA job opportunities through the NASAJobs Web site at: www.nasajobs.nasa.gov. Vacancy announcements will link employees to an online Resume Builder, a Resume Guide and a Quick Apply form for completion and submission.

Because the process is automated, employees will be able to

*See **Process** on page 5*

NASA gives students 'SHARP' experience

NASA release

NASA and Modern Technology Systems Inc. of Riverdale, Md., have selected 208 students to participate in hands-on research at various NASA field installations. NASA's 2001 Summer High School Apprenticeship Research Program, or SHARP, not only allows the students to actually participate in research but pays them a salary as well.

An intensive science and engineering apprenticeship program, SHARP is specifically designed to attract and increase underrepresented students' participation and success rates in mathematics, science, technology and engineering courses. SHARP also is used to encourage career paths that help build a pool of underrepresented science and engineering professionals in the work place.

SHARP apprentices are selected from an applicant pool of approximately 1,200 students nationwide. During their eight-week apprenticeships, students can conduct meaningful research and participate in a variety of educational and professional development activities.

Since its inception in 1980, approximately 3,114 students have participated in the program and more than 3,400 NASA employees have served as SHARP mentors. Although the program is for underrepresented groups, NASA seeks diversity in all student support programs. Consequently, all eligible high school students are encouraged to apply to the program.

SHARP is sponsored by NASA's Education Division and participating NASA field installations. Modern Technology Systems Inc manages the program.

More information is available at: www.mtsibase.com/sharp

Process

Continued from page 4

apply faster, will receive automatic notification of the receipt of their resume and will receive faster, objective and consistent consideration for jobs. With just one resume, applicants will be able to apply for multiple positions at different locations. They will also complete and submit their resumes online through the NASAJobs Web site.

"Because this is a new process, employees will receive briefings, demonstrations and periodic updates on how to use the process," said Hightower. "We are aware that the prospect of preparing a resume may be a new idea to some of our employees, so we will provide aids to help with resume preparation such as training and brochures, a standard automated Resume Builder and Resume Guide on the NASAJobs Web site, as well as other counseling and assistance."

For more information on NASA STARS, visit the NASAJobs Web site or nasastars.nasa.gov or call Susan Cotter at 544-0483 or call Carolyn Plank at 544-6200.

★★★
Marshall Stars
★★★

Wanda G. Reece elected to AIAA Board of Directors

Wanda G. Reece, a Marshall contractor with Pace & Waite Inc., has been elected secretary of the American Institute of Aeronautics and Astronautics (AIAA), Alabama/Mississippi Section.

She was installed as an officer of the board of directors at the AIAA's annual installation and awards banquet June



Reece

22. Reece served as the first chairwoman of the AIAA, Alabama/Mississippi Section in 1989. Reece, an AIAA associate fellow, also chaired the joint AIAA/NASA anniversary celebration in 1998, as well as the AIAA 25th and 30th anniversaries; and coordinated the national AIAA Space Programs and Technologies Conference in 1995.

Reece also chaired Huntsville's first Training and Simulation Conference in 1987, sponsored by the local AIAA section. She has served as an officer of the AIAA section for six years and a board member for eight years, serving as chair, vice chair, secretary, treasurer, public policy director, regional representative, HATS representative, and newsletter associate director.

She served on the Oldtimers' Missile and Space Reunion Committee, representing AIAA, and AIAA's Hermann Oberth Exhibit Committee, both in 1989.

Reece has more than 20 years of technical experience, including experience on the Space Shuttle Flight Data File at the Johnson Space Center in Houston; and Spacelab, Space Station, Chandra X-ray Observatory, Fastrac engine, and her current position on the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) program at the Marshall Center.

She is the recipient of numerous honors, including 13 AIAA awards such as the AIAA, Alabama/Mississippi Section's Engineer of the Year Award, and inclusion in 15 biographies such as "Who's Who in America," "Who's Who in the World," and the first edition of "Who's Who in Science and Engineering." She has master's and bachelor's degrees from the University of Alabama, where she was the first recipient of the Paul "Bear" Bryant Academic Scholarship.

Inertial Electrostatic Confinement research may lead to new space propulsion system

The Marshall Center has joined the research community to study inertial electrostatic confinement — fusion — for various applications including land mine detection, spacecraft propulsion and medical uses, among others.

“The concept is simple, lightweight and cheap to build and operate in the lab. It doesn’t require huge, expensive magnets for plasma confinement like in conventional fusion machines,” said Dr. Ivana Hrbud, who works for Engineering Research Corp Inc. in Marshall’s Space Transportation Directorate.

Marshall’s inertial electrostatic confinement test facility is in Bldg. 4566. A spherical, highly transparent wire basket — cathode — sits on a high-voltage feedthrough in the center of a spherical vacuum chamber — anode. A high-voltage electrostatic field between the anode and cathode ionizes the gas in the vacuum chamber. Ions are accelerated to the center of the wire basket. Fusion products are generated when using hydrogen or deuterium. This experiment also operates with helium, argon and nitrogen, to name a few possible gases. “We are still far away from yielding more power from this device than we put in,” Hrbud said. “But even if we don’t have breakeven fusion yet, we are optimistic that we will be able to exploit high energetic, charged particles for propulsion by learning more about the plasma processes.”

The Universities of Illinois and Wisconsin established active research programs to produce isotopes for medical applications with their IEC facilities. The University of Illinois received a grant from the Daimler-Chrysler Corporation to develop a portable neutron source. Now, this device is marketed as a



Photos by Emmett Given, NASA/Marshall Space Flight Center

Inertial Electrostatic Confinement (IEC) plasma with argon gas.

compact, lightweight, portable, and benign neutron source. Conventional neutron and proton sources require special storage and handling procedures since they are based on the radioactive decay of particular isotopes. Neutron/proton sources based on IEC technology only radiate when they are powered.

“In the summer of 1999, Dr. Jon Nadler, a Summer Faculty Fellow at the PRC from the University of Illinois, introduced the

group to the IEC experiment,” she said. The university loaned the Propulsion Research Center a 1-foot diameter spherical vacuum chamber, a neutron detector and other supporting equipment for the duration of Dr. Nadler’s assignment. The experiment produced 10^6 neutrons per second from the fusion reactions within the plasma.

“The summer program gave us our first exposure to the experiment. Being so intimately involved with the set-up of the experiment, learning about the diagnostics, and how to build highly transparent grids for the experiment, provided us with a unique perspective and insight to establish our own program.” Since then, the group has designed and procured a two-foot, water-cooled spherical vacuum chamber, a 5-kW power supply — which supplies up to 100kV), and other support-



IEC Workshop participants examine the spherical vacuum chamber in which experiments are conducted.

See IEC research on page 7

Workshop introduces Marshall to IEC community

U.S. and Japanese researchers and scientists met earlier this year at the Marshall Center to discuss fusion research, technology and development at the Inertial Electrostatic Confinement Workshop.

This workshop marked first-time participation for Marshall since becoming involved in Inertial Electrostatic Confinement — fusion — research.



Dr. Ivana Hrbud shows the highly transparent wire basket to IEC Workshop attendees.

“About two years ago, the Propulsion Research Center began research in this area,” said Dr. Ivana Hrbud, the workshop organizer who works for Engineering Research Corp. Inc., in Marshall’s Space Transportation Directorate. “The workshop gave us an excellent opportunity to meet with members of this particular research community. Even more exciting and very rewarding is that this community now recognizes Marshall as a partner.

The workshop brought together 35 participants from NASA, the national labs at Los Alamos, N.M., and Oak Ridge, TN, and universities from Japan and the United States to discuss a wide variety of Inertial Electrostatic Confinement topics.

The main goal of the workshop was to advance scientific research and development of Inertial Electrostatic Confinement technology. Workshop attendees identified issues and acknowledged the current status of research across the United States and Japan. “Compared to the billions of dollars spent on fusion research over the past five decades, Inertial Electrostatic Confinement could achieve fusion performance at a cost which is several orders of magnitude less,” Hrbud said.

Of prime interest for Marshall researchers is propulsion and power generation in space. Due to its attributes, Inertial Electrostatic Confinement technology harbors significant scientific spin-offs of special interest to NASA’s researchers and scientists.

Besides power and propulsion in space, the development of scientific instruments and detectors will enhance space exploration missions of our solar system and beyond. One such conceivable application is the detection of water on the Moon or other planets. “Just imagine what materials and isotopes we could discover and identify on other planets, asteroids and comets,” Hrbud said. “NASA scientists and researchers could have powerful diagnostic tools, which are versatile, lightweight, scaleable and affordable.

The new partnership between the established Inertial Electrostatic Confinement community and Marshall will bring mutual enrichment and possibilities. In-space propulsion and science based on Inertial Electrostatic Confinement technology have great potential to evolve and fill NASA’s need for future exploration missions,” Hrbud said.

IEC research

Continued from page 6
ing equipment.

In addition, Dr. Chris Dobson and Hrbud explored innovative grid manufacturing techniques, some of which they successfully demonstrated in proof-of-concept tests.

During June, they performed baseline measurements of current, voltage, mass flow rates, vacuum chamber pressure and plasma radiation counts per minute using Hydrogen. “We observed interesting plasma formations, which we will investigate in the near future. For the next test, which will be performed using Deuterium, emission spectroscopy will help us identifying species and particle motion in the plasma. At the end of

summer, laser scattering and fluorescence techniques are planned for further plasma diagnostics.” There are two summer students involved in this project, one of whom is a fellow of the newly established Undergraduate Student Research Program.

“This concept yields technology and scientific spinoffs with significant near- to mid-term terrestrial and space applications,” Hrbud said. This technology could play a major role in areas such as nuclear waste reduction, airport control, detection of chemical, radiological and even biological materials and weapons, especially when it comes to national security and threat reduction of international terrorism.

Upgrade

Continued from page 1

there is any leakage. Plans are to replace the hydrazine-powered system with a helium-powered system. Because helium is an inert, buoyant and noncombustible gas, it is a safer, more environmentally friendly option than liquid hydrazine.

"We are testing regulators and control valves that already exist in an attempt to speed up system characterization," said Jim Richard, a component designer in the Mechanical Design Group of the Space Transportation Directorate, and the test conductor for this test series. By using "off-the-shelf" hardware, Marshall engineers were able to initiate system testing early on in order to identify and mitigate performance risks in the formulation phase of the program.

Testing of the system is being conducted in the Subsystem and Component Development Department's Component

Development Area in Bldg. 4656. The test facility was built for development of valve and fluid component technology for aerospace applications. The test was set up to simulate the helium portion of the flight system. The flight components and system will be developed based on data obtained from the test series.

"The test objectives are to characterize performance parameters and determine component interactions within the system," Richard said. To do this, multiple sets of hardware will be put through 15 tests each over a period of three weeks.

"Another significant benefit of the testing is to collect data to anchor the analytical model that has been produced by the Vehicle and Systems Development Department's Systems Analysis Group," Richard said.

"The Systems Analysis Group modeled our facility with predictable results,"

Richard said. "They will use our data to make adjustments to the model. After that, they will be able to very accurately model the flight system."

"The big unknown is the performance of the tankage using the big, heavy tanks in the helium gas trailer," Richard said. "We are not able to accurately duplicate thermal conditions because we cannot cool the tanks. We will use the X-34 composite tanks to conduct thermal tests in the next phase of the test program."

Using the X-34 composite tanks to conduct these tests also saves the program money. "Rather than having to build the test facility from scratch, we can speed up the process," Richard said. "We should have the test data we need sometime in the fall."

The Marshall personnel involved in the subject testing play an integral role in the Solid Rocket Booster Thrust Vector

Control upgrades and participate in integrated product teams led by the Solid Rocket Booster Project Office and United Space Alliance. The integrated product teams will utilize the testing to enhance the system design and actively mitigate all risks identified.

In addition to the testing conducted by the Subsystem and Component Development Department's Mechanical Design Group, the Vehicle and Systems Development Department's Vehicle Subsystem Engineering Group, Systems Analysis Group, and Control Systems Group of the Space Transportation Directorate are providing integration and coordination, conducting analysis and generating requirements for the Thrust Vector Control upgrade.

The writer, employed by ASRI, is the Marshall Star editor.

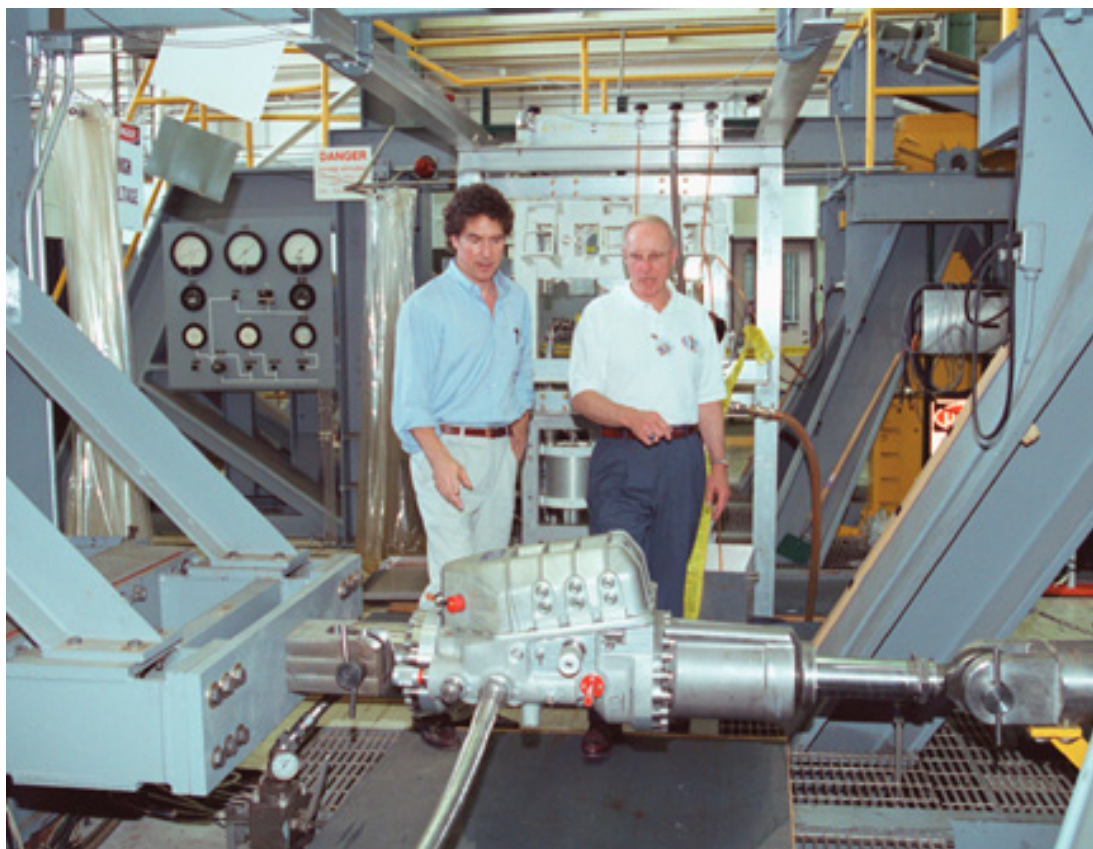


Photo by Doug Stoffer, NASA/Marshall Space Flight Center

Parker Counts, right, manager of Marshall's Solid Rocket Booster Project Office, and David Wood, also of the project office, inspect the Component Development Lab in Bldg. 4656 prior to beginning tests on the thrust vector control proposed upgrade.

Marshall scientist seeks improved methods for weather prediction in Southeast U.S.

by Sherrie Super

A new NASA-developed technique to improve numerical weather prediction — one that looks to the ground as well as the clouds — may one day help forecasters increase the accuracy of spring and summer weather predictions.

Atmospheric scientist Bill Lapenta, of the Global Hydrology and Climate Center, based at the National Space Science and Technology Center (NSSTC), is researching a new method for improving numerical weather prediction in the Southeast United States. Funded through the U.S. Weather Research Program, the research is a cooperative effort between NASA and the National Oceanic and Atmospheric Administration (NOAA).

Numerical weather prediction is a complicated business, which uses data from many sources and combines them to form a prediction of tomorrow's weather. Like a chef creating a favorite dish, Lapenta's recipe, or equation, for weather prediction includes ingredients used by many, along with specialty items used by few.

In addition to standard data — such as current air temperature, humidity and wind speed — he adds a dash of specialized data from Geostationary Operational Environmental Satellites maintained by NOAA.

Using the satellite data adds detailed ground-level information to the numerical forecasts — something Lapenta believes can help forecasters increase the accuracy of predictions. "Understanding weather is more than understanding what's happening high in the clouds," he said. "The satellite data takes into account conditions at ground level, where the weather impacts most people."

This method incorporates factors such as variations in the way different land surfaces react to the energy emitted by the sun.

"From prior NASA research, we know that parking lots, which absorb and hold heat, tend to become much hotter during the day than forests, which are cooled by evaporation," he said.

"Also, the amount of water in the top layers of the soil affects how the Sun's energy heats the overlying air. If the soil is wet, more energy is used to evaporate moisture than to heat the land and

air. We adjust the initial estimate of moisture availability so that the predicted air temperature follows what the satellite senses. The satellite data helps the model to account for such differences in the temperature of the land surface."

Even though the weather-prediction equations are complex, the concept is quite straightforward. Lapenta's model uses an array of geographic grid points. Using these points, the method starts by creating a "snapshot" of the current state of the atmospheric winds, temperatures, and humidity. The next step is to use mathematical equations to predict the evolution of the atmosphere over the course of 48 hours.

"Many details are factored into the weather-prediction equations," he said. "For example, today's rainfall may become tomorrow's humidity through evaporation from the wet soil."

When all standard factors are calculated into his formulas, there is enough information for an initial forecast, but that's not where it ends. He then adds the satellite data, which makes adjustments to the soil moisture availability at each grid point — this can have a dramatic impact on the original prediction.

Lapenta is concentrating on spring and summer weather, because precipitation during warm-weather seasons has been traditionally more difficult to predict.

In addition to improving the accuracy of short-range (0 to 48-hour) predictions of temperature, humidity, and precipitation, Lapenta's goal is seeing this new method implemented within other models, including those used by the National Weather Service. He also sees potential for using the method to improve urban and air quality modeling.

This is a joint research project with Dick McNider of the University of Alabama in Huntsville, and supported by Ron Suggs and Gary Jedlovec, NASA scientists in the Global Hydrology and Climate Center, who process the satellite data. All are located at the National Space Science and Technology Center.

The writer, employed by ASRI, supports the Media Relations Department.

Yardley

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craft and later as the technical director for the Gemini Program.

NASA awarded Yardley its Public Service Medal for his outstanding contributions to the Mercury and Gemini Programs in 1963 and 1966.

Yardley served as vice president and general manager of McDonnell Douglas Astronautics' Eastern Division

before joining NASA in 1974.

At NASA, Yardley served as associate administrator for Manned Space Flight — later renamed Space Transportation Systems — where he led the Apollo-Soyuz Test Project and Spacelab, and was responsible for development and acquisition of the Space Shuttle, launching a new era in human space flight.

Yardley returned to private industry in

1981 following the first successful Space Shuttle mission to serve as president of the former McDonnell Douglas Astronautics Co. In 1989, he retired in St. Louis.

Yardley's wife, Phyllis, four daughters, one son, one sister, nine grandchildren and a great-granddaughter survive him.

Reviewing questions helps prepare for contest

The 2001 Marshall Safety Bowl is fast approaching. This week's questions will test your knowledge of safety. Look for additional questions on "Inside Marshall."

1. Fire exit drills are required annually for:
 - A. All facilities
 - B. All facilities in excess of 1,000 square feet.
 - C. All facilities with more than 10 people
2. What is the most common of all cancers?
3. Automatic timers for coffee makers:
 - A. May be used to turn coffee makers on
 - B. May be used to turn coffee makers off
 - C. May not be used
4. Which of these activities should you wear sunblock for?
 - A. Golf
 - B. Fishing
 - C. Waterskiing
 - D. All of the above
5. The acronym "SSWP" stands for:
 - A. System Safety Work Process
 - B. Space Shuttle Warning Program
 - C. Supervisor Safety Web Page
 - D. Site Safety Warning Process
6. What is the science of matching the physical requirements of the job and the physical capacity of the worker in order to achieve optimal safety and performance?
7. To prevent hot water scalds, particularly in the bathtub, at what temperature should the thermostat on your water heater be set?
8. What is defined as: "A process for determining physical requirements, environmental conditions, and safety factors relating to a specific job or task?"
9. Residual hazards, not eliminated by design, should be _____ by strict program safety policy throughout the program life cycle.
 - A. Defined, documented and reclassified.
 - B. Re-evaluated, reviewed, and rejected.
 - C. Categorized, tracked, and controlled.
10. This term refers to someone who is 100 pounds or more above the ideal weight for their gender and body frame. What is it?

See Answers on page 12

Take necessary precautions when working in hot weather

from Marshall's Safety Office

The Occupational Safety and Health Administration (OSHA) offers information about recognizing, evaluating and controlling heat stress with these 10 tips for workers and employers:

1. Drink cool water. Anyone working in a hot environment should drink cool water in small amounts frequently — one cup every 20 minutes. Employers should make water available. Avoid alcohol, coffee, tea and caffeinated soft drinks, which cause dehydration.

2. Dress appropriately. Wear lightweight, light-colored, loose-fitting clothing and change clothing if it gets completely saturated. Use sunscreen and wear a hat when working outdoors. Avoid getting sunburn.

3. Work in ventilated areas. All workplaces should have good general ventilation, as well as spot cooling in work areas of high heat production. Good airflow increases evaporation of sweat, which cools the skin.

4. Work less, rest more. Supervisors should assign a lighter workload and longer rest periods during days of intense heat. Short, frequent work-rest cycles are best. Alternate work and rest periods with longer rest periods in a cooler area, and schedule heavy work for cooler parts of the day.

5. Ask how workers are feeling. Supervisors should monitor workplace temperature and humidity and check workers' responses to heat at least hourly. Allow a large margin of safety for workers. Be alert to early signs of heat-related illness and allow

workers to stop their work for a rest break if they become extremely uncomfortable.

6. Know the signs and take prompt action. Employees and employers should learn to spot the signs of heat stroke, which can be fatal. Get emergency medical attention immediately if someone has one or more of the following symptoms: mental confusion or loss of consciousness, flushed face, hot, dry skin or has stopped sweating.

7. Train first-aid providers. First aid providers should be able to recognize and treat the signs of heat stress. They should also be able to recognize the signs and symptoms of heat exhaustion, heat cramps and other heat-related illness. Be sure all workers know who is trained to give first aid.

8. Reduce work for anyone at risk. Employers should use common sense when determining fitness for work in hot environments. Lack of acclimatization, age, obesity, poor conditioning, pregnancy, inadequate rest, previous heat injuries, certain medical conditions and medications are some factors that increase susceptibility to heat stress.

9. Certain medical conditions such as heart conditions, diabetes and some medications can increase the risk of injury from heat exposure. Employees with medical conditions or those who take medications should ask their doctors before working in hot environments.

10. Use common sense and monitor other environmental hazards that often accompany hot weather, such as smog and ozone.

Center Announcements

Marshall picnic

The Marshall Center's annual picnic — Family Fun Day — will be held from 10 a.m.-3 p.m. Aug. 25 at the Marshall picnic area.

Upcoming Classes

The following courses will be offered during July:

Clear Writing

This is the last time Clear Writing will be offered for Professional Interns and other Marshall employees until January 2002. The class will be from 8:30 a.m.-2:30 p.m. July 9-13 in Bldg. 4200, room G-13-D. Registration is via AdminSTAR.

Advanced Supervisory Skills

Advanced Supervisory Skills will be taught by Beverly Marchelos from 8:30 a.m.-3:30 p.m. July 11 in Bldg. 4200, room G-13-C. Registration is via AdminSTAR or by calling Janie Moyers at 544-7552.

Contracting Officer Technical Representative (COTR)

This is the final offering of Contracting Officer Technical Representative training for 2001. Anyone needing COTR training should sign up as soon as possible. This class will be taught from 8 a.m.-noon daily, July 16-20, by Phil Taylor and John Cather in Bldg. 4200, room G-13-C. Registration is via AdminSTAR.

Activity Based Cost Management

Activity Based Cost Management will be taught from 8:30 a.m.-4:30 p.m. July 16-18 in Bldg. 4200, room G-13-D. This is the last finance course being taught by Management Concepts this fiscal year. Please register as soon as possible via AdminSTAR.

Clubs and Meetings

Marshall Association meets

The Marshall Association will meet at 11:30 a.m. July 25 in the Bldg. 4203 cafeteria. Jan Wells, mayor of Madison, will speak. Call Efrem Hanson at 544-6340 by July 23 to make reservations. Cost of the meal will be collected at the door.

Blacks in Government

The Huntsville-Madison County Chapter of Blacks in Government will host its Professional Development Training Seminar Dec. 6 in the Tom Bevill Center. Cost is \$125. For more information, call (256) 551-7230 and leave a message.

Sports

SCUBA certification class

The MARS SCUBA club will hold a two-weekend Open Water SCUBA Diving certification class starting July 28. Civil servants and on site contractors are invited. An information barbecue will be held at the Marshall picnic area from 4:30-8 p.m. July 13 for all club members, persons interested in the class, and persons interested in the club. Free food and beverages will be served. At the picnic we will discuss the up coming class as well as the club's functions, resources, annual trips, social events and our history as part of the Center. For more information, call Kurt B. Smalley at 544-6017.

NASA Ski Week

The 11th Annual NASA Ski Week will be hosted at Banff/Lake Louise on March 9-16, 2002. Skiers from six NASA centers will gather at this British Columbian resort for camaraderie and winter sports at three different resorts constituting 7,500 skiable acres. All Marshall employees, on-site contractors, retirees, and dependents are eligible to participate. Interested persons are

encouraged to call 1-233-0705 or e-mail Thomas.S.Dollman@msfc.nasa.gov to request additional information.

Tennis tournament

The MARS Tennis Club will hold an Open Mixed Doubles Tournament July 14. Warm up begins at 8 a.m. and play begins at 8:30. Guest fee is \$5 for this tournament, and at least one member of the team must be a member of the MARS Tennis Club. Refreshments and prizes will be provided after the event. To participate, contact Ronda Moyers at 544-6809 or ronda.moyers@msfc.nasa.gov

Disposal sale set July 18

The Marshall Center will hold a disposal auction sale beginning at 9 a.m. July 18 at the Intergraph Bldg. 21 at 407 Dunlop Blvd. in Huntsville.

This sale will consist of approximately 157 lots of equipment ranging from automated data processing equipment, and test equipment, to furniture.

Screening of items for sale will take place from 8 a.m.-3:30 p.m. July 17 and from 7:30-8:45 a.m. July 18.

The General Services Administration will conduct the sale. For information on the administrative processes (bidding, payments, etc.), call 1-877-472-7068. For more information on the sale, call the Marshall Sales Hotline at 544-4667 or Greg Tate at 544-1774

For general information and a catalog, go to: <http://regions.fss.gsa.gov/r04/property/fssale.cfm> and click on the July 18 sale number. The catalog might not be available until approximately a week before the sale.

Employee Ads

Miscellaneous

- ★ Glass, 1/4X40X63-ideal for desk, table or coffee table. \$20. 881-3661
- ★ Hedstrom rocking horse, \$35; Little Tykes table and chairs, \$25. 650-6286
- ★ Medela pump-in-style breast pump. 721-2239
- ★ Lacquer chest w/large mirror & six-drawer headboard to match, \$250; iron patio table and 4-chairs, \$100. 539-5995
- ★ Kitchen table, solid wood, w/six chairs, \$200 obo; cherry claw-foot coffee table, 1.5 years old, \$75 obo. 509-3392
- ★ Harvard electronic foosball table w/score keeper, \$175; Halex air hockey table, \$100; Valley pool table, \$900. 230-6009 after 5 p.m.
- ★ Playstation w/accessories and games, \$150; Little Tykes desk, \$50; maple dining chairs \$20 each. 430-0470 after 3 p.m.
- ★ Meadowcraft wrought iron patio table w/4 matching chairs, \$75 obo; Pro-Form air walker XT, \$50. 883-5543
- ★ Galvanized steel watering tank, 7' diameter, \$100. 256-721-9107
- ★ 1995 Suzuki RF900R sport bike; 6,200 miles \$4,500; 1992 Suzuki RM250 dirt bike, \$1,600. 961-4575 day/746-9443 evening
- ★ Pickup truck bedliner for full-size pickup, \$75.
- ★ Brunswick pool table, 4x8, 2" slate, approx. 10 yrs. old, \$500. 837-2223 leave message
- ★ Antique oak round table, claw foot, w/4 fancy spindle back cane bottom chairs, no leaf, \$800. 353-0370 leave message
- ★ 1950 and 1951 Farmall Cub tractors with belly mowers, \$2,500 for both or \$1,500 each. 721-9107
- ★ Hay, need party to cut and buy pasture grass, 15 acres near Ardmore. (931) 427-8205
- ★ Harley Davidson golf cart w/removable top, battery powered w/charger, three wheel, \$700 obo. 931-937-6752
- ★ New vinyl water ski vest, size 40-42, Coast Guard approved, \$25. 883-8257
- ★ LP tank, 33 lb., \$50; wheelbarrow, \$25; Bose 151 speakers, \$150. 527-8116
- ★ Mitsubishi CS-36309 36" stereo TV w/ ADV PIP, \$900 obo. (205) 647-4949
- ★ Large corner pine TV/VCR cabinet w/doors and drawer, light pecan finish, \$200. (256) 931-0689
- ★ Sears Vanguard pool table, all accessories, \$350. 837-6109
- ★ Gold's Home Gym, pulley system, bars and weights included, \$150. 464-3300
- ★ Truck bedliner (Protecta Brand) fits 89-98 Chev/GMC regular bed. Installed, \$75. 864-0465
- ★ Motorcycle full face helmet, never worn, red design, \$70 OBO. 864-0465
- ★ Red 1998 GT LTS-2000 full-suspension mountain bike, 16" frame, Marzocchi Z1 fork, 9-speed cassette, \$950, 864-0020.
- ★ Pocketknife collection for sale. Specialty/collector's knives included, total 16 knives. 776-0112.
- ★ Cultured marble vanity w/double basin – gray – 7' long \$35 (retail value \$450). (256) 895-2959
- ★ Sewing machine, new in box, orig. \$300 asking \$225. Above ground pool ladder, new, \$125. 337-5939

Vehicles

- ★ 1996 Ford F150, 6 cyl., 5-speed, swb, 65K miles, new tires, bedliner, factory chrome wheels, \$6,950. 256-753-2278
- ★ 1969 Camaro, all items new, needs paint/upholstery, 400 SB, 4-speed Muncie, 3.73 rear end, \$9,000 obo. 509-3392
- ★ 1988 Oldsmobile 98 Regency sedan, 4-door, automatic, front wheel drive, PS/PW/PDL, \$1,200 obo. 534-3393/714-0581
- ★ 1996 Acura TL 2.5 Premium, leather, sunroof, green, 72K miles, \$10,500. 883-5970
- ★ 1995 Chevrolet 1500 Cheyenne extended cab, many extras, \$9,950. 881-7314
- ★ 1978 Chevy pickup, 2-tone blue, 350-engine, 2-barrel carb., ps/pb, a/c, Trailing Special suspension, auto. Trans., \$650. 778-9149
- ★ 1998 Mazda Millennia, V-6, tint, leather,

sunroof, 35K miles, new Michelins, \$17,000 obo. 751-0992

- ★ 1995 Ford Taurus GL, 4-door, auto, air, am/fm/cassette, 93K miles, \$5,000. (256) 586-2852
- ★ 1990 Bronco II XLT, 4x4 power (locks, windows, steering, etc), blue & white, 152K miles. 721-9831
- ★ 2000 Ranger XLT Super Cab, V-6 auto, bedliner, AM/FM w/CD, towing package w/receiver & hitch, toolbox, 12K miles, \$15,600. (256) 538-8525

Wanted

- ★ Vertical crankshaft, 3.5HP, Craftsman or Tecumseh (lawnmower) engine for parts, doesn't need to run. 881-6040

Found

- ★ Yellow gold "pinky" ring, North side of Bldg. 4487. Call 544-0514 to identify/claim
- ★ Sunglasses, Bldg. 4200, 6th floor. Call 544-4758 to identify/claim

Free

- ★ Kittens, 8-weeks old, kept indoors and handled, great indoor cats. 859-2705

Answers

Continued from page 10

1. C. All facilities with more than 10 people
2. Skin (over 800,000 new cases each year in the U.S.)
3. B. May be used to turn coffee makers off
4. D. All of the above.
5. C. Supervisor Safety Web Page
6. Ergonomics
7. The water heater should be set no higher than 120 degrees Fahrenheit.
8. Job Hazard Analysis (JHA)
9. C. Categorized, tracked, and controlled.
10. Morbidly obese

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